



## **CORROSION PROCESSES, CONTROL, MITIGATION, AND TECHNOLOGY**

The Naval Research Laboratory (NRL) is interested in receiving proposals for research and development in materials performance, environmental effects, corrosion processes, corrosion control and marine coatings technology. These efforts may include studies from basic corrosion mechanistic studies through applied technology and corrosion control initiatives. The areas of research and development activities of interest to NRL include, but are not limited to the following:

- 1) Developing computational modeling techniques for the development of predictive equations of state for materials and mechanistic prediction and prognostics which may be applied to greatly reduce costs and advance techniques, methodology and processes for developing new materials with improved corrosion resistance and structural performance attributes. Specific areas of interest for application of those techniques include fundamental composition modification, forming processes, treatments, processing and augmentation that permit optimization of properties, including corrosion resistance, cathodic protection requirements, reduction in localized effects, stress corrosion cracking resistance, reduced hydrogen embrittlement, etc.
- 2) Improving the physical properties of materials; inhibitors; surface modification and passivation; improving galvanic compatibility; minimizing microbial influenced corrosion (MIC); electrochemical enhancement; plating; hardening; carburization and low temperature carburization; surface coatings; welding techniques; annealing; reducing susceptibility to stress corrosion, cracking, and hydrogen effects; novel methods for metal extraction; ionic liquids; rapid prototyping methods; and, oxidation/reduction effects. Materials of interest for in relation to Navy vessels include but are not limited to: steels, HSLA steels, stainless steels, nickel alloys, aluminum alloys, titanium, copper/bronze, magnesium alloys, composites, polymers, anode materials, and novel materials such as nano-based, amorphous, implanted, flame/plasma spray, novel microstructure and unique technology.

3) Developing marine coatings technologies that contribute to: (1) reducing: total life cycle cost; maintenance and condition based maintenance (CBM); and, surface preparation requirements; and, (2) improving: corrosion performance; resin/formulation properties; coatings durability; dual-use capabilities; inspection capabilities; application technologies; rapid cure/single coat cure capabilities; self inspecting capabilities; radar adsorption; acoustic damping; hull treatment/mold in place capabilities; antifoulant technology; and, cavitation/erosion resistance. Our interest includes all surface ship and submarine platform technologies as well as applications for aircraft, remotely operated vehicles, autonomous vehicles, Marine Corps vehicles, component parts and developing technologies.

4) Development of: sensor technology, corrosion control systems, cathodic protection technology, electrochemical techniques, integrated components, biological materials, novel electronic circuits, smart materials and structures, dual-use systems, control algorithms, computational techniques, physical scale modeling, devices, components, bioremediation techniques, chlorination/dechlorination methods/equipment, descaling/fouling removal applications, electrical isolation, improved grounding, power systems, fuel cell technology, catalysts, membrane technology, materials extraction, novel manufacturing processes – including interstitial hardening and other surface modification processes that improve the corrosion resistance of materials, diamond materials, surface enhancements/detection methods, improved concrete processes/durability, and diver safety technology.

5) Development of materials, coatings, devices, components, product and systems that address crucial Naval and DoD requirements for corrosion prevention, control, remediation, maintenance, life-cycle extension, cost reduction, platform sustainment, sea basing, technical insertion, advanced ship design, propulsion systems, equipment design/specification, system engineering and unique naval applications.

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